

CHAPTER THREE

The First Cities

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3.1 INTRODUCTION

This essay explores the origins of the world's first cities, which evolved in different parts of Southwest Asia. The city of Jericho developed in the Jordan Valley in the eighth millennium BC, with a population of about 2,000. Jericho had formidable fortifications, suggesting that it had accumulated wealth and was targeted by raiders. About one millennium later, Çatalhöyük (or "Çatal Hüyük") developed in present-day Turkey, with a population of about 5,000. The city produced obsidian tools and other craft products, and may have served as a regional trading center. In the second half of the fourth millennium BC, Uruk developed in southern Mesopotamia (in present-day Iraq), with a population of about 50,000. The central religious organization was the dominant force in the economy, producing a wide variety of private goods such as barley, cloth, and pottery. The offerings to the 2,400 gods doubled as payments to the managers of temple enterprises.

Our knowledge of the economic features of these cities is derived from the material that city residents left behind. Archaeologists have excavated the piles of rubble that used to be cities, uncovering city walls, buildings, household implements, tools of craft fabrication, and religious objects. In the case of Uruk, archaeologists have also discovered clay tablets with primitive forms of writing. In trying to piece together these bits of information to form a picture of life in the first cities, we must be careful not to jump to conclusions, but instead recognize the speculative nature of any conjectures. In this essay, I will try to avoid the trap that has ensnared many scholars, including one who "was not always able to control his imagination and his weakness for paradoxes." Given our limited knowledge about these early cities, many puzzles remain. In addition, future excavations may reveal other cities that developed earlier.

3.2 CONDITIONS FOR URBANIZATION

A necessary condition for the development of cities is an agricultural surplus. Urban employment diverts labor from food production, and the remaining

workers must produce enough to feed themselves and city workers. The domestication of barley and wheat occurred in about 10,000 BC in the areas of Southwest Asia that were to later generate the first cities. The domestication of animals – goats, sheep, cattle, and pigs – occurred about 2,000 years later.

Jacobs's (1969) contrary view is that cities preceded the development of agriculture. She suggests that city dwellers initially consumed imports from hunter-gatherers. If imported nuts and seeds were mingled and spilled onto fertile ground, the combination of happenstance and opportunism could lead to the domestication of the most productive hybrids. If the wildest of the imported live animals were eaten first, opportunistic city dwellers could then domesticate the tamest animals. Jacobs argues that urban development caused agricultural innovation, and uses the city of Çatalhöyük to illustrate her "cities-first" theory.

As noted by Bairoch (1988), Jacobs's theory ignores "the tyranny of distance." Before the domestication of animals, food transport was costly because the human transporter consumed a large part of the load. Van de Mieroop (1997) uses the area around Çatalhöyük to illustrate the problem with Jacobs's theory. Given the low productivity of hunting and gathering and the high costs of human transport, the accessible hunter-gatherer output would not be sufficient to feed the residents of Çatalhöyük. Bairoch notes that although urban development didn't cause the invention of agriculture, it did contribute to its diffusion.

An agricultural surplus is not sufficient to generate cities. The costs of high-density living are obvious: competition for land drives up the price of land, and density causes congestion and pollution. To explain why cities develop, we must identify economic benefits that more than offset these obvious costs:

- 1 In a region with trade, if there are scale economies in trade services (record-keeping, transportation, finance), organizations that provide these services will generate concentrations of employment, causing the development of trading cities. Jacobs (1969) emphasizes the role of trade in the development of the first cities.
- 2 If there are internal scale economies in production (internal to the firm), the concentration of workers in a single enterprise will generate a city.
- 3 If innovation and learning are facilitated by physical proximity of individual producers, the clustering of producers will generate a city.
- 4 If citizens consume a public good that requires physical proximity for collective consumption, the concentration of consumers will cause the development of a city. Some examples are cities based on defense and religion. Mumford (1961) suggests that the first cities developed when earthen gods, who were worshiped at small village shrines, were replaced by celestial gods, who were worshiped at large temples administered by a priestly class.

3.3 JERICHO

Archaeological evidence suggests that the first city in the world was Jericho (Tell es Sultan), situated at a junction of travel routes in the fertile Jordan Valley. The site was occupied in the period 8400–7300 BC, with a population of about 2,000.

The fertile Jordan Valley had a reliable supply of water, and residents domesticated crops (barley and wheat) and animals (goats and sheep). In addition, the spring near the city attracted wild game, providing a ready supply of gazelle and other wild animals.

There is some evidence of trade in the area, but it appears that the volume of trade was small. Among the city's imports were obsidian from Anatolia, green stones from Jordan, turquoise from the Sinai, and shells from the Red Sea. There is no evidence of production for export from the city. The likely export goods were raw materials from the nearby Dead Sea, including salt, bitumen (for sealing and adhering), and sulfur.

3.3.1 Defense: the walls of Jericho

The most startling feature of Jericho is a formidable system of defense, consisting of a wall, a surrounding ditch, and a tower. The wall was about 7 m tall and 3 m thick at the base, and was built with undressed stone to surround an area of about 4 ha. The ditch surrounding the wall was 9 m wide and 3 m deep, and presumably served as a moat to discourage assaults on the city's protective wall. The tower was located just inside the wall, and was at least 8 m tall and 9 m in diameter. The tower presumably served as an observation post to anticipate the arrival of hostile forces.

The building of the fortifications involved enormous amounts of resources, both labor and material. The walls were built of undressed stone, not formed bricks, and the stone was transported long distances to the city site. To dig the moat, the workers scooped out solid rock at the base of the wall, a task apparently performed with the simplest of tools, the stone maul. There is no evidence of even simple stone digging tools, and of course metal tools weren't available for another 5,000 years.

The presence of these massive fortifications suggests that agricultural productivity in the area was relatively high. A productive food sector freed up a large fraction of the population to work on building and maintaining the city's fortifications, and could generate enough wealth to attract thieves. In sifting through the rubble of several thousand years of occupation, archaeologists have not yet found any stores of wealth that would have attracted raiders, so the nature of the booty (goods stolen in war) remains a mystery. One possibility is a storable agricultural product.

The fortifications also suggest the presence of persistent raiders. The city was located at the junction of several travel routes, making it a convenient target in the same way that modern convenience stores (Stop-and-Shop; Stop-and-Rob) are easy targets. The city was surrounded by hunter-gatherer groups, and archaeologists speculate that these groups occasionally supplemented hunting and gathering with stealing. At the time, the technology of war involved attacking at a distance with bows and arrows (a range of 100 m) and slings (a range of 200 m), and using spears and maces for close combat. The artwork dating from the time of Jericho provides evidence of organized attacks, with warriors arranged in columns.

Given the technology of war at the time, the fortifications would have been the appropriate response to frequent raids (Ferrill 1997). Archers could position

themselves atop the walls, allowing them to keep attackers at a distance, preventing them from scaling the wall. The methods for assaulting city walls – the battering ram and undermining – hadn't been invented yet, so the wall was an effective defense. Fending off attacks wasn't without cost: archaeologists estimate that about a quarter of the population served as defenders.

3.3.2 Why did Jericho develop?

Given our limited knowledge about everyday life in the city of Jericho 10,000 years ago, we can merely speculate about its origins. Recall that the possible reasons for urbanization are (i) trade and the resulting cluster of activities that support trade (record-keeping, transportation, finance), (ii) large-scale fabrication with large workforces, (iii) clustering of producers to promote innovation and learning, and (iv) public goods such as religion and defense that require physical proximity.

It does not appear that Jericho owes its existence to trade or large-scale production. There is no evidence that city residents fabricated tools or other craft goods. This eliminates the possibility of large workforces, and also means that the city didn't produce any products to trade with other regions. There may have been some trade in raw materials from the nearby Dead Sea, but what appears to be a small volume of trade could not have supported a city of 2,000 people.

There is not much archaeological evidence concerning religious activity. There is evidence of small shrines in individual dwellings, as well as a large building that served some public function, perhaps serving as a temple. This "temple" building had a large central room that appears to have had a ceremonial function, and annexes with domed ceilings. Among the religious objects found were figurines of a mother goddess, presumably an icon of a fertility cult. In addition, there appears to be what Kenyon (1957) labels a "Cult of Skulls." Some of the amassed skulls are covered in plaster as portraits of venerated ancestors. There is no evidence that religion was a public good requiring physical proximity, so it appears that the city does not owe its existence to religion.

Based on archaeological evidence, it appears that Jericho developed to provide a public good, defense. Given the frequency of raids, the wealth of households needed protection, and the collective provision of defense is more efficient than provision by individual households. A small group of raiders, armed with spears, maces, and bows, could overwhelm an individual household and steal their wealth. A group of households could match the personnel and weaponry of a raiding band, but would fare better by combining resources to build fortifications that discouraged attacks. Given the substantial labor cost associated with its fortifications, the residents of Jericho apparently had something to protect, but the nature of the booty remains a mystery.

3.4 ÇATALHÖYÜK

Çatalhöyük was a city of around 5,000 people in the sixth and seventh millennia BC. The city was on a 13-ha site in the Konya plain, an area that is now part of Turkey.

The city fed its residents with domesticated crops and animals, and produced a wide variety of craft products, some of which were exported to other regions.

The food economy of the city was based on simple agriculture and domesticated cattle. The domestication of cattle, which provided the bulk of meat as well as transport, contrasts with the domestication of sheep and goats by other cultures. The city grew wheat and barley on irrigated land, and also harvested legumes, nuts, fruits, and berries. The city residents hunted boar, deer, bear, and leopard for supplementary meat and skins. In addition, the residents of the city consumed dairy products and beer.

The most unusual feature of Çatalhöyük was its building architecture. Flat-roofed buildings were stuck together, with back-to-back walls. There were no ground-level entries, so people entered a house through the roof, using a retractable ladder. The small windows on the buildings were placed high in the walls, well beyond human reach. Archaeologists speculate that this architecture promoted the defense of the city. The exposed walls of the outermost buildings formed a wall around the entire city, presumably deterring small groups of raiders trying to steal the city's wealth.

3.4.1 Production and trade

The people of Çatalhöyük were involved in highly sophisticated and specialized production of products made of wood, stone, and obsidian. The black obsidian from a nearby volcano was flaked and polished to produce points (for spearheads and arrowheads), wedges (for scraping and butchering), blades, and mirrors. Imported flint was fashioned into daggers. The city's polished stone industry produced a wide variety of products, including statuettes, perforated mace heads, stone bowls, greenstone axes, and chisels. Workers in the city processed shell and bone into ornaments and tools. Woodworkers squared oak and juniper for construction purposes, and also produced bowls, dishes, and boxes with lids.

The production of obsidian products had several stages. Itinerant workers chipped obsidian from a volcanic site about 150 km from the city and processed the raw obsidian into "cores," reducing the bulk and weight of the material. The itinerants then transported the cores to Çatalhöyük for further processing. In the city, skilled workers used pressure and punching techniques to fashion obsidian products from the cores. The itinerant workers then served as transporters and traders, exchanging obsidian products for products from other regions.

In recent experiments, workers have tried to duplicate the production process for obsidian tools in Çatalhöyük. The experiments revealed the high level of skill required for tool production:

Recent studies indicate that pressure flaking (of blades) is a difficult and demanding practice, which requires extensive knowledge of rock flaking properties as well as good neuromuscular coordination. The latter takes several years to acquire, but allows thereafter a very high productivity . . . Consequently, pressure flaking conforms to the typical criteria one associates with the highly skilled and productive practice of a specialist. (Conolly 1999)

Conolly concludes that specialization occurred within a kin group, with some members of the extended family engaging in part-time obsidian tool production for the kin group.

One of the lingering questions about Çatalhöyük concerns the location of craft production. Archaeologists have not yet uncovered any workshops for the processing of obsidian, wood, or stone. Based on the existing evidence, it appears that production was not concentrated in workshops, but dispersed among individual homes.

There is evidence that Çatalhöyük was involved in interregional trade. The city exchanged its craft products – obsidian and stone tools, ornaments, and wood products – for resources that were not available locally. Archaeologists have discovered flint from Syria, shells from the Mediterranean, and bitumen from the Dead Sea. The city also imported wood and copper from nearby sources. Among the imported materials of unknown origins are various types of rocks, including apatite, rock crystal, and jasper.

Was Çatalhöyük isolated, or part of a system of cities? Recent archaeological work has uncovered several smaller settlements close to Çatalhöyük. In addition, there is evidence that the city's culture spread to the entire Konya plain and the outlying areas. These discoveries have led to speculation that Çatalhöyük was a sort of regional trading center, the largest city in a system of cities that traded with each other and with people outside the region.

3.4.2 Religion

The religious activities of Çatalhöyük were not concentrated in a single large temple, but distributed throughout the city in shrine rooms in individual houses. The wall paintings and plaster reliefs in the shrine rooms show a mother goddesses exhibiting unusual feats of fertility. The shrine rooms also have bucrania, sculptures of wild ox heads, complete with long horns. One object that appears in many shrines is a bench with up to seven pairs of sharp ox horns pointing upward, making for uncomfortable sitting but presumably a better relationship with the gods.

The shrines also contained offerings to the gods. These offerings included deposits of grain and legumes, new and used tools, pots and bone utensils, animal bones, bull horns, and stamp-seals. Among the obsidian tools serving as offerings were arrowheads and spear points that were too thin and fragile for use in actual hunting. High-status people were buried below the floor of the shrines, along with worldly possessions such as textiles, jewelry, mirrors, adzes, daggers, obsidian points, and clay seals.

3.4.3 Why did Çatalhöyük develop?

Compared to Jericho, our knowledge of the economic life of Çatalhöyük is much better. Nonetheless, there are gaps in our knowledge, and we can only speculate about the reasons why the city developed about 9,000 years ago.

It appears that Çatalhöyük owes its existence to its production of obsidian tools and other craft products. The production of obsidian tools required a high skill level, meaning that two phenomena were present in the industry:

- 1 Innovation: someone must develop the innovations that lead to a sophisticated production process.
- 2 Learning: the skills must be passed on to new workers.

The concentration of production in a city – with workers located close to one another – would hasten both innovation and learning. In general, cities facilitate innovation because they bring people of different backgrounds and skills together to exchange ideas. Cities facilitate learning because workers learn by observation, and there are more people to observe in cities. In general, there are benefits from physical proximity of production facilities – even if they are in tightly packed houses rather than in factories – and Çatalhöyük may have been the center for innovation and learning in the production of obsidian tools.

A second possible reason for cities is the provision of defense as a public good. Given the massive fortifications of Jericho, the idea that the Çatalhöyük architecture – houses stuck together, with roof entryways and high windows – would deter raiders seems far-fetched. But perhaps the booty-seekers in the time of Çatalhöyük were different from the raiders who tormented Jericho. The simple architectural fortifications of Çatalhöyük, combined with some system of organizing people to defend the city from raiders, could have in fact deterred potential raiders. If so, defense could have been a public good that encouraged the clustering of people in the city.

3.5 CITIES IN SOUTHERN MESOPOTAMIA

Starting in the middle part of the fourth millennium BC, a cluster of cities developed in Babylonia, the southern part of Mesopotamia (the area around the Tigris and Euphrates rivers in present-day Iraq). The population of Uruk, the largest city in Babylonia, reached 50,000 at the end of the fourth millennium BC. Other cities, each with tens of thousands of people, developed nearby, including Ur, Erudi, and Kish. In this essay, I focus on the economic features of these cities from the middle of the late fourth millennium BC to the early part of the third millennium BC.

3.5.1 The ecological setting

Babylonia had a number of rich and varied ecosystems, including alluvial plains, rivers, and grasslands. These ecosystems were suitable for a wide variety of food-producing activities, including farming (barley, emmer, fruit), fishing, hunting (wild pig, gazelle, wild asses), and grazing (sheep and goats for wool, hair, and milk). In contrast to its rich agricultural resources, Babylonia lacked many basic raw materials, including hardwood, basic metals (copper, tin, silver, lead), and precious stones. The dry climate did not support rain-fed agriculture, but the water from the Tigris and the Euphrates rivers was easily diverted into canals, allowing the cultivation of lands beyond the banks of the rivers. The first rudimentary irrigation canals date back to 5500 BC.

Given its ecological setting, Babylonia was a perfect candidate for specialization and trade. The varied ecosystems generated comparative advantages in different parts of the region, opening the possibility of specialization and gains from trade. Similarly, the combination of rich agricultural resources and limited raw materials generated a comparative advantage in agricultural goods, opening the possibility of interregional trade, with agricultural goods being traded for raw materials.

Given its many comparative advantages, it seems likely that Babylonia would eventually develop a system of specialization and trade, causing the development of trading cities. In the middle of the fourth millennium BC, however, there were two major impediments to widespread specialization and trade. First, there was no money, and exchange was based on barter, an awkward system with high transaction costs. Second, writing hadn't been invented, so there was no system of recording transactions. People involved in trade were dependent on human memory and honesty to keep track of transactions, and were presumably reluctant to trade with strangers. As a result, specialization and trade typically occurred at the kin-group or village level.

The development of cities in Babylonia in the middle of the fourth millennium BC, before the invention of writing and money, remains a puzzle. The question is: How did the Babylonians overcome the obstacles of barter and illiteracy to develop widespread specialization and trade? One possibility is that the Sumerians, who migrated to the region some time between 4000 BC and 3500 BC, brought a social system that made cities possible. The Sumerians provided the region with the dominant spoken language and a system of religion. Over the second half of the fourth millennium, Sumerian priests developed a system of recording transactions, culminating in the invention of writing in 3100 BC.

3.5.2 Religious beliefs

The Sumerian religion adopted in Babylonia was based on the belief that the gods determined the fertility of flora and fauna. The gods were responsible for all natural phenomena, with each of the 2,400 gods responsible for a piece of the natural order. For example, the crop gods included Innana, originally responsible for ripening dates, and Ashnan, responsible for the productivity of grain fields. The domesticated herd gods included Dumazi, who determined the timing of livestock births, and Lahar, who was responsible for the productivity of sheep. There were also gods for hunting, including Suagan, who was responsible for generating large and accessible herds of gazelles and wild asses. Together, the gods were responsible for ecological continuity, keeping nature working as it had in the past. The Babylonians did not ask the gods to perform miracles, but simply asked them to continue the "miracle" of nature. The role of the gods was to keep the crops growing, the dates ripening, and the wild asses running on time.

The role of humans was to provide goods to the materialistic gods, freeing them to manage the natural world. According to the Sumerian legend of the origin of humans, second-rate gods originally tilled the soil to provide for the

needs of greater gods, who were busy with the tasks of nature management. When the second-rate gods tired of tilling, they persuaded the other gods to create humans to feed, clothe, and shelter all the gods. According to Bottéro (2001):

The faithful were convinced that humans were created and put on earth for the sole purpose of ensuring, through human industry and solicitude, that the gods led an opulent and worry-free life, free to concentrate on the government of the world and its inhabitants.

In other words, the gods were not mystical beings with mysterious motives, but simply hungry managers.

People offered huge volumes of goods to the gods, and most of the goods were ultimately consumed by members of the temple staff. In other words, the goods provided to the gods were not sacrificed in the traditional sense. The gods were housed in large, luxurious temples, and were fed four elaborate meals per day. After the fully prepared food had sat in front of the statues of the gods for a while, it was distributed to the religious elite and members of the temple staff, who numbered in the hundreds. An old Sumerian saying is “the priests eat off the altar.” Some members of the staff lived in the temple area, sharing the luxurious accommodation with the icons.

Of course, some of the goods offered to the gods were not consumed by humans, but were true sacrifices. For example, people provided the gods with festive clothing and precious jewelry. Resources were used in the production of icons and ceremonies. The most famous image of Babylonian cities, the ziggurat, actually came much later, in the late third millennium BC, about a millennium after the cities first developed.

3.5.3 Religious offerings as a public good

The religion of Babylon is an example of a public good, at least a perceived one. Religious contributions freed the gods to better manage the ecosystem (e.g., by bringing favorable weather), so the fertility of flora and fauna increased. A more fertile ecosystem made everyone more productive, so each person's contribution benefited everyone. In other words, the social benefit of a religious contribution exceeded the private benefit.

We can use a simple example to illustrate the public-good nature of religion. Consider a group of 1,000 people, and suppose that a religious contribution of one bushel of barley was assumed to increase each person's productivity by 1/100 bushel. The marginal social benefit of a one-bushel contribution is 10 bushels ($1,000/100$), compared to a marginal social cost of only one bushel. The marginal social benefit exceeds the marginal social cost, so a contribution is socially efficient. However, the private benefit of a contribution is only 1/100 bushel compared to a private cost of one bushel, so a rational individual won't voluntarily make the contribution. This is the free-rider problem: no single individual has an incentive to make a socially efficient contribution. The challenge for the religious

authorities in Babylonia was to get individuals to act in the social interest. To get people to contribute, some sort of collective decision-making would be required.

Could the religious authorities solve the free-rider problem by promising an uncomfortable penalty for free riders in the afterlife? In Babylonia, an afterlife incentive program was not feasible because the people believed that everyone had the same afterlife – a long, quiet time in a bland location below the earth – regardless of their earthly behavior.

One possible solution to the free-rider problem is a sort of public sharecropping arrangement. Suppose that the religious authorities announced that each person was obligated to give 10 percent of his harvest to the gods. A potential problem with this scheme is keeping track of who contributed: in a pre-literate world without money, it would be difficult to insure that each citizen contributed the appropriate share of the harvest. Although tracking contributions might not be a problem with a small number of beneficiaries (e.g., at the village level), the Babylonian gods were responsible for ecosystem management for the entire region, so there were tens of thousands of beneficiaries.

An alternative to public sharecropping is for the religious authorities to take administrative responsibility for the economy. The temple could manage the region's land and water resources, organize production, and engage in inter-regional trade. By administering a centrally planned economy, the temple could collect the aggregate output of the economy and reserve the appropriate share for the gods. The leftover output could then be distributed to the workers and other citizens.

In the fourth millennium BC, Babylonia had a mixed economy, with a wide variety of temple enterprises as well as some private enterprise. According to Potts:

Herding, weaving, pottery manufacture, metalworking, woodworking, stone working, agriculture, gardening, forestry, fishing, beer production, and baking, just to name the most obvious activities, all came within the purview of the temple administration, as did the distribution of rations in *naturalia* (e.g., barley, oil, wool, etc.) (Potts 1997, p. 237)

The archaeological evidence is insufficient to determine the fraction of the economy directly administered by the temple, but it is clear that the temple was the dominant force in the economy. In amassing the offerings to the gods, the temple supplemented the residuals from temple enterprises with sharecropping contributions from private enterprises.

3.5.4 Temple enterprises

In the fourth millennium BC, the temple owned and managed a large fraction of the agricultural land around the city. Some of this land was made productive by the temple's irrigation projects. There was some privately held land, including land owned and cultivated by villagers, and land owned by city dwellers who had either inherited it or received land grants as a reward for service to the

temple. The temple granted land to individuals for service in farming, plowing, fishing, herding, and craft production.

The temple operated as a sort of vertically integrated agricultural firm, being involved in every step of the production of grain. The temple hired workers to build and maintain the irrigation system, plow the fields, plant the seeds, process the grain, and store the grain for future use. These workers were paid rations in barley, oil, and wool, which they either consumed themselves or used in the barter economy to trade for other products. The temple was also involved in production on private lands, hiring workers to plow the fields and distribute seeds.

The temple also acted as a vertically integrated textile firm. Professional herdsmen, hired by the temple, raised sheep on grasslands around the city. The temple's wool office collected the wool and distributed raw wool to villagers near the city for initial processing (cleaning and fulling). Large workshops in the city transformed the processed wool into textiles, and the temple took ownership of the finished textiles.

The temple was responsible for interregional trade, with textiles serving as the main export good. Although wool is bulky and thus costly to transport, finished cloth is not, and the region had a comparative advantage in textile production. The temple exchanged textiles for copper, tin, wood, silver, and precious stones from nearby regions. The imported metals and precious stones provided the raw materials for the city's metallurgy and jewelry industries. Trading opportunities were enhanced by the location of Babylonia at the junction of trade routes linking Asia and the Mediterranean.

The temple's output – the sum of output from a wide variety of temple enterprises and contributions from private enterprises – was distributed in several ways. First, some of the output was offered to the gods and then consumed by temple personnel, including priests involved in rituals and others who managed the temple enterprises. Second, some of the output was distributed as rations to the workers who built and maintained the irrigation canals, worked on temple farms and workshops, and were engaged in interregional trade. Third, the temple ration was given to people incapable of working, including children and the aged. Fourth, some of the output was used in interregional trade.

Why was the temple involved in so many economic activities? The temple provided a mechanism for collective decision-making, but unlike governments in the modern world, did not confine its activities to the provision of public goods; for example, religious services and public works. Instead, the temple produced all sorts of private goods, defined as a good that is rival in consumption (consumed by a single person) and excludable (a person who does not pay can be prevented from consuming the good). In the modern mixed economy, private goods such as grain, cloth, and pottery are produced by private enterprise, not a central authority. Why were things different in Babylonia?

The disadvantages of the central provision of a private good are obvious. A central authority generates a monopoly, and the lack of competition is likely to cause relatively high prices and small quantities, leading to the familiar deadweight

welfare loss from monopoly. In addition, a large organization is likely to be less responsive to changing economic conditions.

In the fourth millennium BC, one advantage of temple enterprise was related to the barter system. In an economy without money or writing, people tended to trade with people they knew and trusted; that is, members of their kin group in the local village. To get people to trade beyond the kin group, there had to be a system that engendered trust, and the temple provided such a system. The temple specified the terms of trade, in particular the temple ration amount for each occupation, and also produced the goods (barley, oil, and wool) that could either be consumed by the recipient or bartered for other goods. It is possible that the temple served as a trusted broker, encouraging specialization and trade beyond the kin group.

A second possible advantage of temple enterprise results from double counting of contributions to the gods. Most of the offerings to the gods were actually consumed by temple workers, not only the people involved in religious activities, but also those involved in managing temple enterprises. The offerings counted two ways: as an offering to the gods in exchange for ecosystem management, and as payment to temple workers in exchange for enterprise management. This double counting generated an advantage for the temple enterprise that at least partly offsets the inefficiency associated with central control.

A third advantage of temple enterprise is that it solves the free-rider problem for the citizens involved in the enterprises. Rather than asking citizens to contribute some fraction of the output of their private enterprise, the temple simply took the appropriate share for the gods and redistributed the rest. For the remainder of the economy – private enterprise – the temple used sharecropping arrangements to collect contributions to the gods.

3.5.5 The technology of writing

An important part of the economic history of Babylonian cities was the invention and refinement of writing. This development freed people engaging in trade from their reliance on human memory and honesty. Writing was developed by priests, and the immediate effect was probably to strengthen the dependence of the economy on the temple organization. In the long run, however, writing allowed traders to put their trust in permanent and verifiable records, which may have contributed to the increase in private enterprise at the expense of temple enterprises.

The earliest attempts to record transactions, developed in Babylonia in the fourth millennium, employed *bullae*, closed clay containers with counters inside. For example, when a person contributed 10 goats to the temple, the priest would record the transaction with a container holding 10 icons representing the goats, the container being marked with the contributor's unique seal. The bullae were used by temple authorities to record the inputs and outputs of temple enterprises, and to track the contributions of private enterprises. One problem with the bullae system is that to verify the transaction (to tally the goat counters), the container had to be broken. A second problem was that it required each person

to have a unique seal for identification purposes, and these personal seals were costly.

Writing developed in Uruk in about 3100 BC. The first writing involved etching symbols (pictograms) into clay tablets, with a unique symbol for each object. For example, the symbol for an ear of corn looks like a cornstalk, while the symbol for an ox is an inverted pyramid with two lines coming out the top. Similarly, each person was assigned a unique personal symbol. Clay tablets recovered from Uruk use pictograms to record the number of oxen received by the temple from different individuals. The symbols were etched into wet clay, which was then baked or left to dry to serve as a permanent record. This simple system allowed information to be retained and conveyed to other people.

The pictogram system was awkward because it required a unique symbol for each object. Archaeologists estimate that the Babylonian pictogram system had about 1,500 symbols. About 100 years after the first object-oriented pictograms, the Babylonians shifted to using symbols to represent sounds (syllables) rather than objects. This allowed objects to be represented by different combinations of a smaller set of symbols. For example, the Sumerian word for "arrow" was pronounced *ti*, and so was the word for "life." Under the phonetic system, the word for life was represented by the symbol for its homophone, the arrow. In general, each word was depicted with a series of symbols, one for each syllable. The phonetic innovation reduced the number of symbols used to about 400. Eventually, most of the pictograms were replaced by symbols that combined straight lines and wedges, known as cuneiform script (*cuneus* is Latin for "wedge").

Writing was invented by temple priests and first used to keep track of temple business. Writing emerged after several hundred years of collecting offerings for the gods and managing temple enterprises. In the Sumerian language, the words for "priest" and "accountant" are used to refer to the same people, suggesting that the priests used their invention to serve as the city's accountants. Writing was used exclusively for commerce between 3100 and 2600 BC. Starting about 2600 BC, writing was used for hymns, prayers, myths, and the relaying of wisdom. This first step toward literature occurred before cuneiform text, so much of the meaning of the texts is obscure.

The timing of the invention and refinement of writing reveals an important feature of innovation. It appears that writing didn't just happen, but instead was a response to the practical problem of how to keep track of transactions in a barter economy. The priests in Uruk had been tracking the transactions of the temple for a long time before they came up with the idea of recording transactions on clay tablets. Over the next several centuries, they perfected the idea of writing, motivated by the challenges of record-keeping.

The development of writing contributed to urban development because it facilitated specialization and trade. Writing decreased transaction costs, so it increased the net gains from trade, allowing a fuller exploitation of underlying comparative advantages. As writing spread beyond Mesopotamia, the opportunities for specialization widened, trade increased, causing the development of trading cities. In the case of Babylonian cities, writing came after the development of cities, so it merely reinforced the growth of cities.

3.5.6 Summary: cities in Babylonia

Why did cities develop in Babylonia about 5,500 years ago? There were many regions with rich and varied ecosystems, and presumably comparative advantages that could have led to widespread specialization and trade. Why did cities develop in Babylonia first? Stated another way, given the high transaction costs in an economy without money and writing, why did cities develop in Babylonia so soon?

The key feature of the Babylonian city was the temple organization. The public-good nature of religion required a central location to both collect offerings to the gods and perform religious rituals. The cluster of purely religious workers may have generated a large town or a small city, but it probably would not have supported the large cities that developed. The population of Uruk was boosted by the many temple enterprises, which required workers to manage the enterprises, collect the output, and distribute the output as payments to managers and rations for workers.

The Babylonian cities also had a large number of workers involved in craft production. The temple's workshops were located in the city, presumably to facilitate management by the temple. In addition, the clustering of workshops would generate the same sort of agglomeration economies that we observe in modern cities. The different workshops could share the suppliers of intermediate inputs, and the cluster would also facilitate innovation and learning.

3.6 CONCLUSION

Our knowledge of the economic life in the world's earliest cities is limited by the evidence from sifting through the rubble of the cities, but we can draw some tentative conclusions about their origins. It appears that Jericho owes its existence to a combination of an accumulated surplus (of unknown nature) and the raiding activities of people in the Jordan Valley. The city of Çatalhöyük developed as a center for the production of craft products (obsidian tools, stoneware, and wood products), and as a trading center. The city's defensive architecture may have promoted urbanization for reasons of defense, but only if local raiders were more easily discouraged than the raiders who tormented Jericho.

Our knowledge of Babylonian cities is vastly superior to our knowledge of Jericho and Çatalhöyük, but is still incomplete. These cities developed before the use of money and writing. Religious organization may have provided a trusted broker in the illiterate barter economy, encouraging specialization and trade beyond the kin group. One advantage of temple enterprise (over private enterprise) was that temple managers were paid from offerings to the gods. A second possible advantage was that direct control by the temple provided a better response to the free-rider problem. Babylonian cities were relatively large because they contained pure religious workers as well as those responsible for managing temple enterprises, collecting the output of temple enterprises, and distributing the output to managers, workers, and other citizens.

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